CSC 480: Artificial Intelligence

Assignment 1 Write Up

Minh Bui

Video Presentation submitted to D2L

**I/ Program output**

**1/ BFS**

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# CSC 480 Artificial Intelligence I #

# Assignment 1 : 8-puzzle solver #

# Minh Bui #

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Available commands:

1. Set strategy. Current strategy: AStar2

2. Run easy test case: 1 3 4 8 6 2 7 0 5

3. Run medium test case: 2 8 1 0 4 3 7 6 5

4. Run hard test case: 5 6 7 4 0 8 3 2 1

5. Run custom test case.

6. Run a random test case.

7. Quit

1

Available strategies:

1. Breadth first search

2. Depth first search

3. Uniform cost search

4. Greedy best first search

5. A\* Search with No. of misplaced tiles as heuristic

6. A\* Search with Sum of Manhattan distances of tiles as heuristic

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Available commands:

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2

Easy problem:

1 2 3

0 8 4

7 6 5

Total moves: 1

Maximum queue size: 3

Number of nodes popped: 4

Final state:

1 2 3

8 0 4

7 6 5

RIGHT,

Available commands:

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Medium Web problem.

2 8 1

0 4 3

7 6 5

Total moves: 9

Maximum queue size: 236

Number of nodes popped: 364

Final state:

1 2 3

8 0 4

7 6 5

UP, RIGHT, RIGHT, DOWN, LEFT, LEFT, UP, RIGHT, DOWN,

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Hard web problem.

5 6 7

4 0 8

3 2 1

Total moves: 30

Maximum queue size: 73554

Number of nodes popped: 518085

Final state:

1 2 3

8 0 4

7 6 5

UP, LEFT, DOWN, DOWN, RIGHT, RIGHT, UP, UP, LEFT, LEFT, DOWN, DOWN, RIGHT, RIGHT, UP, UP, LEFT, LEFT, DOWN, DOWN, RIGHT, RIGHT, UP, UP, LEFT, LEFT, DOWN, DOWN, RIGHT, UP,

**2/ A\*2:**

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**Conclusion:** For harder problems that require a much larger search tree, A\*2 definitely performs much better than BFS.

**II/ Tables comparing the length, cost, time, and space of the different search methods using the Easy, Medium, and Hard inputs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Easy | | | | |
| Alg | Length | Cost | Time | Space |
| BFS | 1 | NA | 4 | 3 |
| DFS | 1 | NA | 2 | 3 |
| UCS | 1 | 8 | 6 | 4 |
| GBF | 1 | 8 | 2 | 3 |
| A\*1 | 1 | 8 | 4 | 4 |
| A\*2 | 1 | 8 | 4 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Medium | | | | |
| Alg | Length | Cost | Time | Space |
| BFS | 9 | NA | 360 | 236 |
| DFS | Fail | Fail | Fail | Fail |
| UCS | 9 | 31 | 144 | 95 |
| GBF | 33 | 127 | 75 | 55 |
| A\*1 | 9 | 31 | 62 | 51 |
| A\*2 | 9 | 31 | 62 | 51 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hard | | | | |
| Alg | Length | Cost | Time | Space |
| BFS | 30 | NA | 517721 | 73554 |
| DFS | Fail | Fail | Fail | Fail |
| UCS | 30 | 128 | 419294 | 53671 |
| GBF | 144 | 718 | 1661 | 1143 |
| A\*1 | 30 | 128 | 351424 | 49145 |
| A\*2 | 30 | 128 | 351424 | 49145 |